



Keeping Warm

Which Material is Best for Keeping the Heat In?



Activity

EQUIPMENT

1. Various spoons made of different materials (e.g. metal, plastic, wood), jar of hot water.



2. Three identical beakers, 3 thermometers (alcohol or digital ones), 3 different materials (e.g. cotton, kitchen foil, bubble wrap), 3 rubber bands, hot water, watch or clock.



SUGGESTED CLASS LEVEL

5th – 6th

PREPARATION

Collection of materials
Supply of hot water

BACKGROUND INFORMATION

Heat flows from something warmer to something colder. But if you put something around the warmer body which does not let the heat out of it, then you have an insulator. Some things are better insulators than others. Things which let heat pass through them easily are called conductors. Metals are good conductors of heat. Air is a good insulator; so things which have air trapped in them, like cotton wool, sponge, fibre glass, fur and feathers, are good insulators.



This is how animals and birds keep warm; but humans need clothes to keep warm.

TRIGGER QUESTIONS

What do you do in cold weather to keep warm?
(Rub hands, run, turn on heating, close doors and windows, put on warmer clothes etc.)

Why is it better to wear two thinner layers of clothes than one thick one on a very cold day? *(The air between the two layers helps to keep the heat in also).*

If you are feeling cold what does putting on a coat do?
(Your body is usually warmer than the surrounding air.

A coat has lots of air pockets in between the strands of material, so a coat keeps the heat in).

Why do we often use wooden spoons when we are stirring hot things? *(Wood is not a good conductor of heat)*

Do you notice any difference if you use a metal spoon? *(Metal spoons get hotter)*

If you put a coat on a snowman do you think he would melt faster or slower? *(Slower, - because remember! - a coat does not let heat pass through it easily – in either direction!).*





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Activity

CONTENT STRAND

Energy and forces: Heat

Materials: Properties and characteristics of materials

SKILLS

Predicting, investigating (fair testing) and experimenting, measuring, recording, analysing.

CROSS-CURRICULAR LINKS

Environmental Awareness

Mathematics: representing and recording data

ACTIVITY

1. Do Different Spoons Conduct Heat in the Same Way?

Which of the spoons do you think will feel the hottest when they are placed in hot water?

Put the different spoons in the jar of hot water and leave them for a minute or two. Now feel the handles of the spoons. Do they all feel the same? Can you explain? Do you think some materials conduct heat better than others?



2. Test which Materials are the Best Conductors of Heat, using a Scientific Investigation.

First of all predict which of the materials will keep the water the warmest, and which the least warm. Then carry out a test to see if you were right.

Make a chart like this:

Time (minutes)	Temperature (°C)
0	
1	
2	
3	
4	
5	
6	
7	

Wrap up the 3 beakers in 3 different materials (fair testing – the same number of layers in each). Now put the same amount of hot water in each. Take the temperature of the water in the 3 beakers and record it. Take the temperature at regular intervals, say every minute, up to about 7 or 8 minutes. Put your readings in the chart.

Now look at and analyse the results.

Which material kept the water the warmest?



SAFETY

Care with hot water

FOLLOW-UP ACTIVITY

1. Leave one beaker uncovered and compare the temperatures.
2. Compare natural and man-made materials and see if there is any difference.
3. Cover the beakers, and see if this makes any difference.
4. Wrap up one beaker of water in black material and another one in white material of the same kind (e.g. both cotton) and take the temperature of both after a while. Is there any difference?